How the Discovery of Accidental Childhood Poisoning Contributed to the Development of Environmentalism in the United States

By John C. Burnham
The Ohio State University[1]

The change in values that underlay the rise of the environmental movement in the second third of the twentieth century grew in part out of shifts in perceptions.[2] One of the most important shifts was seeing danger in the environment from toxins based on artificial chemicals. These toxins were not the usual poisons. Instead, they came into the environment without any particular human agent. This paper traces one of the major origins of this shift in perception.

In 1986, sociologist Robert S. Broadhead reported that he had detected a change in the meaning of the term, *poison*, in the middle of the twentieth century. Originally, he noted, "poison was associated with deadly substances found in nature—toxic plants, insects or snake venom—or human concoctions invented for villainy or suicide. But, since the 1950s, poison has come to be defined as virtually *any* substance or material, however innocent."[3]

The change that Broadhead described was contemporaneous with the origins of the modern environmental movement. This timing was not coincidental. The change in the idea of poison was in turn largely the product of the discovery of accidental childhood poisoning and the resulting poison control center movement, which originated in North America and spread worldwide. As popularized in the 1950s, the new conceptualization of poison created a receptive audience for the warnings that environmental activists issued in the 1960s. The very language of the poison control movement appeared in such core documents of the environmental movement as Rachel Carson's *Silent Spring*, published in 1962. "Every hardware store, garden-supply shop, and supermarket has rows of insecticide .... chemicals are sold under brand names that never suggest their identity or nature," Carson wrote.[4]

In the title to his article, Broadhead called attention to Officer Ugg, Mr Yuk, and Uncle Barf—logo characters for poison control centers. Those centers constituted the institutional expression of new ways of viewing toxins. The logos served particularly to try to warn younger children about the dangers of poisonous substances in the immediate environment—particularly the home. It was the idea of omnipresent and ubiquitous synthetic chemicals in the home environment that accelerated the idea that toxins in the environment in general could pose a hazard. As Samuel P. Hays has written,

> The common phrase that brought together home and more remote natural environments was "backyard." Opponents of hazardous-waste sites said emphatically "not in my backyard," and urban wilderness advocates spoke of their prized wildlands as their own backyard.[5]

Changing Definitions of Poison

Lloyd Stevenson long ago traced the history of the idea of poison and the ways in which people believed that some substance—animal, vegetable, or mineral—caused symptoms of illness, including fatal illness. There were even traditional ideas of poison as the basis for infection or a disease process contracted from the air such as malaria.[6]

But in the first half of the twentieth century, Americans viewed poisons as specific substances that required a human agent to administer them. The only exceptions to this scenario took place in the artificial environment that appeared in the workplace when the concentration of some substance grew to the point of poisoning the workers, as in the case of radium or various kinds of dust. But in ordinary life,

there had to be a human agent. Even when industrialization caused unusual concentrations of poisons, as in shipping, federal law at least provided merely that labels should warn workers of the dangerous contents of material that they were handling.

For most Americans, poisoning was a specific act about which they did not normally have to worry. How did this lack of concern about poisons become transformed in public discourse into acute awareness of toxins?[7] It was when poisoning accidents occurred in the home, which was a category of environment. Futhermore, these poisonings set off social alarms that had theretofore sounded only in situations in which there were unusual concentrations of poisons: typically, the workplace. After World War II, Americans began to learn that substances that were not delivered by a human agent were poisoning people who not only were unintentional victims but were indirect and unexpected victims of some toxic substance. Furthermore, those substances were often the new synthetic chemicals just coming onto the market.[8]

Background to the Pediatricians' Involvement

The people who effectively detected and publicized the new dangers were medical specialists who limited their practices to children: the pediatricians.[9] Pediatricians did not just invent the idea of accidental poisoning and the risks that surrounded youngsters. These specialists were reacting to medical problems with which they had to deal in their work every day. The movement was American. Awareness of the problem did not arise in Britain, for example, because the incidence of childhood accidental poisoning in pediatric practice was very much lower than in the United States—owing, it was believed, to the fact that British homes at that time did not contain the chemicals that abounded in more prosperous America.[10]

It is possible to see in the pediatric literature how the change in the meaning of poison took place. The old meaning did not disappear, but increasingly an additional conceptualization was superimposed in the medical writings until the idea of toxins became thoroughly ambiguous. Simultaneously, the whole subject of the diagnosis and treatment of poisoning appeared more and more prominently. For example, in the early 1940s in the *Year Book of Pediatrics*, poison was not even listed in the index, only specific substances such as lye. Then in 1945, a whole new section appeared, "Therapeutics and Toxicology." The transformation was not just an editorial blip or a coincidence.

Rather, it reflected the changes that were taking place in the literature of the specialty in general.[11]

During the twentieth century, the subject of poisons in a domestic setting had appeared first in the larger context of the category of accidents and came to be called "accidental poisoning." In the United States, one special organization, the National Safety Council, had begun in 1912 to try to influence public behavior so as to reduce the number of accidents. The sponsors' initial concern for industrial safety soon extended to society at large, outside of the workplace, and the most sensational success of a non-occupational safety program came from the decline in automobile accident fatalities in the 1930s. Subsequently, statistics showed persistently that one-half or more of disabling accidents occurred in the home, and the National Safety Council in the mid-1930s launched a major campaign to improve safety in the home. The discovery of accidental childhood poisoning therefore developed in the context of a home safety program, one particularly directed toward housewives, beginning in 1937. Epidemiological evidence of child accidents was accumulating, but until medical groups joined in, observed Thomas Fansler, director of research for the National Safety Council in 1948, mere safety campaigns would have but slight effect.[12]

By the 1940s, it was clear that among the specially vulnerable group—children under five years old—7 out of 10 fatal accidents took place in the home. It also became clear that accidents had become the leading cause of death of Americans ages 1 to 19. Among the very young—those one to four years old—accidents accounted for 11 percent of all deaths in 1930, but 17 percent by 1950. It was in the midst of this shift, just after World War II, that the pediatricians entered the story. They found it particularly frustrating that accidents did not seem to be declining as were other causes of children's deaths. These tragic deaths also appeared to pediatricians to be preventable.[13]

The growing concern of pediatricians appeared in the context of two fundamental changes that had taken place in American life by the 1940s. The first was that fatalities from infectious and other diseases had diminished dramatically. By the middle of the decade, it was commonplace for pediatricians to observe that "deaths due to the communicable diseases of childhood have decreased 90 percent, and infant mortality has been cut by nearly 60 percent in the last twenty-five years."[14] This great improvement in the area of infectious and metabolic diseases led to very high expectations—expectations of dramatic improvements that were not fulfilled in the area of accidental deaths.

The second change fueling pediatricians' concerns was that a strikingly increased number of potentially dangerous chemicals had accumulated in the everyday environment, specifically in dwelling places. Pediatricians who later became active in the campaign against poisoning were explicit about these changes, not only the growing prominence of accidents but particularly the dangers of poisons in homes. Both were simply phenomena that the practitioners observed. In a survey conducted by the new Committee on Accident Prevention, established in 1950 by the American Academy of Pediatrics, members of the Academy reported that poisonings accounted for half of all accidents reported and burns another 30 percent.[15]

The First Steps in Pediatricians' Involvement

The actual events in the discovery of childhood accidental poisoning were of both a general and a specific kind. The general development was that as physicians' concern about infections diminished, the conspicuousness of incidents of accidental poisoning increased greatly. Even the coldest reported case histories of poisoned children implicitly suggested the desperate, shared frustration of the parents and physicians. It does not take much reading between the lines of the reported case of a little girl, seventeen months old,

> who ingested an unknown quantity of yellow, green, and blue water color paint. She was admitted to the hospital eight hours later in a semicomatose condition, having rapid and shallow respirations, vomiting, and bloody diarrhea. She was treated with parenteral fluids but failed to respond and died five hours later following an attack of convulsions.[16]

In fact, in the consciousness of pediatricians, the incidence of poisoning appeared to be greater than it actually was. Each incident was so dramatic and often traumatic for the practitioner, who felt helpless when there was a disabling or fatal outcome in a case that usually presented as urgent, if not a complete emergency. G. W. Kernodle of Duke University, for example, commented in 1948 on the impressions that physicians had:

> I imagine that any one associated with the pediatric ward at Duke Hospital for the past ten years would estimate that several hundred patients had been admitted during that time for treatment of the effects of lye ingestion. In reviewing the records, however, only 136 cases were found."[17]

Medical reports also often mentioned explicitly (with sometimes openly expressed indignation) the ignorance or negligence that permitted what appeared to be an unnecessary, that is, preventable, sacrifice of a child's life or health.

The specific identifiable actors in the discovery of childhood accidental poisoning were physicians working in the public health arm of the Metropolitan Life Insurance Company, particularly George M. Wheatley, a pediatrician with public health training. His immediate superior, Donald B. Armstrong, a prominent public health specialist, was already active in the National Safety Council.[18]

At that time, public health statistics were notoriously unreliable, and for decades much public policy developed on the basis of statistics gathered by the Metropolitan, which had a large and therefore substantially representative industrial insurance clientele. The company public health officers were in turn guided by the concrete findings of company statisticians, and when childhood accidents began to appear prominently in the statistical reports, the physicians of the Metropolitan directed significant efforts to the prevention of accidents.[19]

Wheatley in particular began to work to make pediatricians, physicians, and the public aware of the problem of children's accidents of all kinds. In 1948, in an editorial in *Pediatrics*, he announced a campaign of the American Academy of Pediatrics, in collaboration with the U.S. Children's Bureau and the National Safety Council as well as Metropolitan Life, "to reduce accidents to young children." He cited various studies already underway to discover the causes of accidents, including "the home environment." And he cited the independently articulated concern of a Chicago pediatrician, Edward Press.[20]

Wheatley and Press soon found themselves drawn into a campaign specifically to prevent the accidental poisoning of children. Wheatley reported that in the course of his work for Metropolitan Life, when he spoke at medical gatherings about accident prevention, physicians would come up to him afterward and specifically tell him their concerns about the poisonings that were so conspicuous in their practices. In 1950, by the chance that both the American Academy of Pediatrics and the National Safety Council were meeting in Chicago, Wheatley and others were able to confer with National Safety Council officials and impress upon them the special problem presented by very young children. The men in the National Safety Council had not theretofore really thought about—if they even knew about—toddlers who explored their surroundings, often by ingesting anything ingestible. As a result of this meeting, the National Safety Council was soon more deeply involved, and Wheatley, now as chair of the Academy

Committee on Accident Prevention, was leading other collaborative efforts. The question of poisonings was so urgent that he appointed Press to head a special committee on accidental poisoning. Press's work led directly to the formal founding of the Poison Control Center movement in 1953-1954.[21]

The professional concerns of both Wheatley and Press illustrate the rapid changes that were taking place in the medical practices within which poisoning was discovered. Wheatley had been rendering conspicuous service in addressing the problem of an infectious disease, rheumatic fever, when he was drawn into accidents and then poisoning. Press, likewise, had been notable in investigating an infectious disease, scarlet fever, before he, too, was drawn into the accident problem and subsequently poisonings. In both cases, actual pediatric practice significantly determined the problems that each one addressed.

New Approaches in Public Health

The transformation of the concept of poison within the more general campaign against accidents involved other new elements in the world of medicine. The most direct effect of medical thinking came from the field of epidemiology. In 1949, John E. Gordon of the Harvard School of Public Health followed up the idea that accidents could be treated as just another variety of disease and insisted that consequently epidemiological approaches should be used. What was significant was that the epidemiology that he envisaged using was based on the idea that disease could be avoided by controlling the environment. There were, he said, three determining elements in that environment: the physical or geographic (such as lightning striking), the biological (such as disease reservoirs in animal vectors), and the socio-economic. Gordon took pains to emphasize the socio-economic, which involved, as he put it, "association of man with his fellow man." In order to cut down on accidents, said Gordon, it would be necessary to get at these social environmental causes. He was, of course, reflecting an emphasis in public health in general on prevention. Within the context of public health prevention, physicians could and did talk about devising some sort of social "safety vaccine" to ward off accidents.[22]

Gordon defined the causes of accidents as specific material things—"the faulty pavement, the scalding water, the unguarded poison." He further confirmed that the major site of accidents was the home. It was in such a way that he and many other physicians, especially pediatricians, began to conceptualize the home as the environment in which accidents—and notably poisonings—took place.

Present in the home were specific material items, including poisons, that caused accidents. In practical terms, accident prevention in the 1940s and 1950s was therefore directed at improving the home environment.[23]

It was in this program of going into the environment—at first the home environment—to prevent accidents that the pediatricians made their fundamental contribution, the one detected by Broadhead: changing the meaning of the idea of poison.

How Pediatricians Reconceptualized the Problem

Pediatrics was central because the perceived poisoning problem was concentrated among very young children. Pediatricians, upon close examination, discovered that past a certain point, children could not be held responsible for substances that appeared in their environments and poisoned them.[24] The second discovery of pediatricians was the insidious way in which the child's environment had become filled with poisonous hazards. At an earlier time, foods had often been the source of poisons, but pure food laws now made such incidents rare, and everyone had been trained to wipe possible pesticide residues off fruit. But in the mid twentieth century and in practical terms, the home contained chemicals from other sources. Those chemicals usually came in the form of consumer products.[25]

Consciousness of new types of poisons and the fact that they were situated in the home can be traced through the pediatric literature. Some physicians were quicker than others to understand and articulate the general change, but taken as a whole, comments in technical publications showed an intellectual shift that accompanied mobilization of the profession in a variety of campaigns to reduce the growing number of accidental poisonings among children.

Initially poisonings had appeared in the literature under the heading of diseases of the part of the body involved—the gastrointestinal system or the lungs—just as traumatic accidents were classified under the part of the body damaged, such as the bones, the skin, or the head. The assumption was the conventional one that the poison was a simple, easily identified substance. One 1930 physician believed that with the inevitable "restless, investigating, and meddlesome child," the only practical method of preventing accidental poisonings was to keep poisons out of the house altogether. Indeed, he would have liked to have prohibited the sale of these poisons—clearly well known—to any family with children.[26]

This old idea—of a simple, obvious poison that affected a locality in the body in a definite way—receded as the new awareness of accidents entered medical discourse. The experience of the physicians included two additional facets. First, they talked about the new conditions of "civilized life," as they put it, under which the enormously expanded number of poisons appeared in the immediate home environment. Second, the physicians offered in the technical literature suggestive case histories of children who were poisoned by items that were to some degree unforeseeable.

Synthetics as a Special Hazard

"As our population becomes more urban and our consumption of synthetic materials grows with each year," wrote two U.S. Food and Drug Administration officials in 1943, "the problem of acute and chronic toxicity becomes increasingly important to the public health .... Increased exposure to toxic substances is a consequence of modern civilization."[27] This statement foreshadowed the type of observation that would become ever more common in medicine and public health in the following decade and a half. Particularly striking was the use of the term *toxicity* instead of poison, for it was years before others made the transition from specific, identifiable poisons to more general and less obvious sources of toxicity. Some pediatricians spoke of the industrial productions of manufacturers, as did John Aikman of Rochester in 1943:

> No emergencies present more variety and interest than the poisoning accidents of children. Here we have unusual, dramatic, and even fantastic problems presented for immediate solution and treatment. The constant introduction of new poisons into agriculture and industry is astonishing. Unfortunately, there is considerable lag before the danger of new chemicals is detected and effective measures for treatment found. The magnitude of the problems can be appreciated when we know that the California Agricultural Code has jurisdiction over nearly 5,000 materials introduced for pest control of all kinds. A large part of these may become a problem when brought in the reach of and in contact with the runabout child.[28]

The number of consumer products turned out by industry also multiplied.[29] By the 1950s, Edward Press was listing a "wide variety of agents, such as drugs; do-it-yourself and home hobby supplies; hair-waving, dyeing, and bleaching solutions; and cleaning, polishing, and disinfecting substances, present in the average household, ... [affording] a multiplicity of objects available to the inquisitive toddler and

child and greatly increas[ing] the hazard of poisoning over that existing one or two generations ago." Press concluded that, "our modern environment is becoming packed with poisons."[30]

Chemicals in the Home Environment

The reports of materials in the home environment provided specific opportunities for explaining and conceptualizing the way in which younger children were constantly endangered even in the most familiar and presumably safe surroundings. Hazardous substances about which pediatricians could find warnings in the literature included, for example, a home "cold wave" beauty preparation that was ingested by a toddler. In that and similar cases, the attending physician had no medical literature on which to draw in diagnosing and treating what turned out to be potassium bromate poisoning.[31] To cite another example, not only could babies swallow naphthalene moth balls—a known hazard—but babies could even absorb the naphthalene, it was discovered, through their skin from diapers that had been in storage.[32] Moreover, there were constantly appearing in the children's environment, according to writers in the pediatric literature, new sources of toxicity such as thallium.[33]

Although the usual lye and kerosene tragedies continued to be reported, unfamiliar substances that pediatricians added to the list of hazards changed the configuration of dangers in the 1940s and 1950s. By 1955, Morton J. Rodman of Rutgers University was able to find more than 800 retail products for sale in New Jersey that were common household products that posed a threat to children. These included furniture polishes, paint solvents, cleaning and bleaching agents, cosmetic preparations, and an additional "astonishing variety and number of preparations and chemicals." Writers at the time emphasized that many of the hazardous substances were new on the market, such as a wide variety of detergents.[34]

The Special Case of Iatrogenic Poisoning

One very important type of poisoning served as a model and stimulus to concerned child specialists: poisoning by medicines. In these cases, substances that were introduced into the home for beneficial purposes—often by physicians themselves—turned into what the editors of the *Home Safety Review* in 1948 called "sneaky killers." Many such new substances represented a hazard for children. Benadryl, which Parke Davis introduced in 1947, soon showed up in childhood poison-

ing statistics. Another was reported by Roy Hertz of the National Institutes of Health in the late 1950s: "ingestion of estrogens is to be added to the ever-increasing list of toxic exposures to which modern children may be subjected." Clearly the physicians felt concern, if not guilt, over the increasing incidence of what later would be called iatrogenic poisonings, prefiguring the mixed feelings that environmental campaigns later generated among other Americans: they had tried to improve life by introducing substances that, it turned out, could have toxic effects.[35]

Child specialists had known for a long time that individual patients could have idiosyncratic reactions to various medications, such as antitoxins, and specific circumstances could render ordinary substances toxic. In Japan, low calcium diets in children after World War II triggered phosphorus poisoning when a child's diet exposed him or her to otherwise quite innocuous quantities. At that time there was in medicine, moreover, much emphasis on allergies, which showed up when circumstances caused an ordinary substance that was breathed, touched, or ingested to set off pathological processes in individual cases.[36]

But the poisoning problem took physicians much further than allergy and simple overdoses. Pediatricians repeatedly continued to express alarm that just having normally harmless drugs around constituted a danger to children. Physicians were aware that part of the "socioeconomic environment" in fact constituted those adults who not only through ignorance or negligence administered accidental overdoses of drugs to children, but who made medicines a part of a child's surroundings. A specialist in 1949 summarized the situation that a physician should be expected to correct: "Surveys on home visits reveal obvious hazards for the young child, such as dangerous medication left within reach when crawling and walking begin. Physicians may contribute to this death rate by injudicious use of mercurials, boric acid, salicylates, and sulfonamides."[37]

When physicians came to examine substances that children ingested, medicines often constituted the chief hazards. In Omaha from 1949 to 1953, almost half of the children's hospital poisoning admissions involved medications—more than hydrocarbons, household cleaners, or insect and rat poisons. The main offender came to be children's aspirin, newly flavored like candy, beginning in 1947. One of the triumphs of the pediatricians' anti-poison campaign was getting manufacturers to adopt so-called "child proof" containers, which drastically reduced aspirin poisonings. Vitamins, too, increasingly a common part of the home environment, accounted for substantial numbers of acci-

dents. "Physicians are not alone in yielding to the urge to be generous with the plethora of pills and potions," wrote Charles D. May in 1958. "Of 27 infants who developed intoxication from vitamin A, 25 received the toxic dose through vitamin supplements from the hands of their parents, eager to provide an excess of anything they believed to promote health."[38]

Sydney S. Gellis of Boston in 1951 spelled out the subtle change that was taking place: "Many of the commonly used drugs are no longer regarded by the public as drugs and therefore potential poisons. Aspirin is employed so commonly that bottles of the tablets are left lying around, thus accounting for many cases of fatal salicylate poisoning. The same is true of aspergum or feosol tablets ... [and] vitamins."[39]

What Pediatrics Had to Offer Environmentalism

By the 1950s, the reports of poisoning by health substances, and particularly by vitamins, included conspicuously the use of the term *intoxication*, which had the implication of long-term exposure, as opposed to acute poisoning. This was a particularly clear sign of the change that carried pediatricians from a concern about accidents to concern about toxic substances in the environment. Another linguistic change signaling a shift in physicians' outlook was the increasing incidence of the term *toxic quantity*, by which physicians signified that a harmless and useful substance could in excess become dangerous.[40]

Such technical shifts were appropriate for the period before the 1960s, and they presaged the birth of environmentalism. Ralph H. Lutts has suggested the ways in which, before 1962, new thinking about radioactive fallout influenced *Silent Spring* and subsequent environmentalist concern about chemicals.[41] In a parallel way, pediatricians' discovery of accidental childhood poisoning and their attempts to control it interacted with stages in the embryonic environmentalism of the 1950s and after.

Historians such as Hays have defined the stages through which environmentalism passed. In the rising expectations for the quality of life after World War II, early environmentalists focused on the effects of pollution in the air and water. Only in the late 1960s did ecological thinking about the food chain and the interdependency of life gain significant representation, and only in the 1970s did concern about personal health further interact significantly with ecological thinking.[42] But throughout this time, the child specialists' discoveries and the poison control center movement were providing major social sources for conceptualizing environmental poisons.

At least as early as other groups, pediatricians repeatedly voiced alarm about the new substances that appeared in the World War II period. These specialists were therefore among those instrumental in moving concern about toxic chemicals from occupational settings to Americans' more general environment. In 1948, the organic pesticide, parathion, was introduced commercially, and within a short time eight occupational deaths were reported from contact with parathion. Meantime, on September 21, 1951, in eastern Washington state, "L.D.N., a 9-month-old white female infant" playing in her yard handled a can containing "a pasty mixture of parathion and DDT," which had been discarded a week earlier. Her parents washed her mouth out and bathed her and put her to bed. According to the medical report,

> She slept restlessly for about one hour, then awoke screaming and shivering. In view of these symptoms, ... the parents called the family physician who advised that the child be taken to the hospital where she was admitted at 5:30 p.m.... A stomach lavage was done immediately and 1/300 grain of atropine was administered .... the pulse rate was 128 per minute .... She was then given elixir of phenobarbital to stop her violent crying .... The cyanoisis deepened and respiration became very shallow. The patient became comatose. Artificial respiration and oxygen were started, but at 8:00 p.m., ten minutes after respiratory failure cardiac action stopped. Adrenalin injected into the heart had no effect.

The tragic case of L.D.N., which was reported some months later with other cases of parathion poisoning, served to alert pediatricians that another dangerous new substance had moved out of the realm of occupational medicine—the unusual circumstances and concentrations of the workplace environment—into the familiar home environment or "backyard." As two Wilmington, Delaware, physicians noted in 1953, the problem of poisoning had become "principally a nonoccupational one and is, specifically, a household problem. The situation is not static. Various new materials continue to appear in the home ...."[43]

Cases of poisoning also led pediatricians to pioneer other approaches to environmentalism. Public health concern about pollution in the early twentieth century tended to follow the bacteriological model and focus on dangers that came with specific, identifiable diseases that lurked in garbage and other organic impurities. In the eyes of people of that time, any chemical contamination tended to be visible or otherwise obvious (and there was, of course, much of that), just as poisons were clear and obvious in medical teachings of that time. Bacterial agents had also been definite and identifiable. But the new

chemicals that Americans of the middle and late twentieth century believed to threaten "the environment" were often subtle in their appearance, and in addition, could not easily be differentiated from safe chemicals.[44]

Pediatricians continually referred in the technical and popular literature of their specialization to two model instances of poisoning in which the chemical agent was neither obvious nor suspected. The first was the case of lead poisoning that appeared when people heating or cooking with a stove attempted to save money by burning discarded battery casings instead of coal and wood. The resulting lead fumes, as was discovered in the 1930s, mysteriously poisoned the children in the home. Despite urgent public health warnings, cases of poisoning from the burning of battery casings continued to occur, and they were mentioned conspicuously in the medical literature into the second half of the twentieth century.[45]

The other model case was that of acrodynia. First identified in 1920 in Oregon, acrodynia was a most distressing sickness in which a child, typically from one to four years old, developed an afebrile disease that lasted for months or years as the child lost interest in his or her surroundings, and, in a most miserable way, failed to thrive. In addition, there were serious symptoms, including a redness of hands, feet, nose, and ears that caused it to be called "pink disease." About ten percent of the youngsters afflicted died. The cause was unknown, and since it tended to appear in very localized areas, physicians assumed, not unreasonably, that it was an obscure viral or perhaps bacterial contagious malady. Shortly after World War II, however, with the help of new instrumentation, clinical researchers showed conclusively that acrodynia was no special disease but rather childhood mercury poisoning. The danger of mercury in such cases had not been obvious but had come in some hidden or indirect manner, as in various medicines and teething powders, de-worming preparations, sealing wax, felt hats, batteries, and wood treated for protection against termites.[46]

Chronic Small Doses of Toxins

Both battery casing fume poisoning and acrodynia showed the way in which an apparently innocuous environment suddenly caused a small child to become ill and even die because of some toxic substance in the surroundings that no one could at first detect. In each case, the medical problem was special because of the type of patient, an infant or young child. Infants and young children are often specially susceptible to substances that are ordinarily not clearly poisonous. Adults in battery

casing homes, for example, were not affected even though they breathed the same fumes, and so no one suspected a poison.

Moreover, one of the new aspects of fears of environmental toxins was the possibly aggregating effect of repeated small and even undetectable doses of a substance that ordinarily produced no clinical symptoms unless there were massive exposures. Most everyday medicines were considered safe unless there was a serious overdose. Occupational hazards involved unusual exposures, not at all to be expected in a normal environment. But preschool youngsters, the typical victims of accidental poisoning, turned out to have extraordinary sensitivity to chemicals that, as in the case of the battery casing fumes, did not particularly affect adults. When pediatricians focused on childhood poisoning, they consequently also tended after World War II to become alert to the possible presence of very small quantities of hazardous substances. In the 1940s, for example, specialists were alerted to the dangers posed for babies by tiny amounts of nitrates in water, amounts that did not seem to affect adults. By 1960, still two years before *Silent Spring*, the Committee on Nutrition of the American Academy of Pediatrics, to cite another example, was already sounding the alarm about the presence of traces of hormonal chemicals, then being added to meats, that might prove harmful to children.[47]

The sensitivity of tiny humans generated in physicians a concern similar to the fear of the cumulating effects in adults of very small exposures that were not overtly poisonous in the usual ways. Cumulating small doses of DDT was exactly the factor that instigated much of the ecological phase of the environmental movement. Moreover, as clinicians recognized, pediatricians had a special responsibility to report any sign of toxicity in a child so that they could signal to other physicians and public health officials the existence of a new hazard that adult bodies might not detect in an immediately obvious way.[48]

Impersonal Poisons in the Environment

The young victims of accidental poisoning were part of another shift in the meaning of poisoning: no active human agent was involved. The most obvious examples were the infants mentioned earlier who absorbed a dangerous chemical from their most immediate environment, their diapers. They were entirely accidental victims, and no one, not even the parents who earlier used the household preparation that contained the small quantities of a hazardous substance, actively poisoned the babies. In another and similarly illustrative case of poisoning

from diapers, babies became gravely ill from an otherwise harmless dye customarily used to stamp hospital linen, including the diapers.[49]

The effect of the pediatricians' encounter with myriad new substances and unobvious sources and quantities of hazardous chemicals was to shift the physicians' attention away from the human agents to the substances themselves.[50] Indeed, the very term, "agent," now commonly referred to a substance, not a poisoner.

Hence was born in 1953 the poison control center movement, which focused on substances. At an early stage in the movement, the term "poisoning control," with the suggestion of human action, changed into "poison control," emphasizing the toxic material. The very existence of the centers emphasized watchfulness for hazardous substances in the environment. The emphasis on the substances also brought a move parallel to that which marked the full development of the environmental movement, at least in the area of toxic concerns: concentrating on the source of the hazard, which also in practice meant shifting costs for control to the source, typically the producer of the substance—exactly what happened, for instance, in the case of manufacturers' adopting child-proof bottles for candy-flavored aspirin. Indeed, pediatricians of the post-World War II period could already cite the way in which measures banning an agent, Fourth of July firecrackers, had diminished fireworks accidents dramatically, or they could add the example of the decrease in bichloride of mercury poisoning, attributable, as one clinician observed, to "the fact that this drug is now sometimes put up in tablets resembling a coffin."[51]

The Poison Control Center Movement

The name of the poison control centers indicated another aspect of their function—controlling poisons. Hays points out that one of the dynamic viewpoints that fueled the environmental movement was that the undetected poisons "unexpectedly crop up in one's immediate environment" as well as in the food chain—in short, that "the entire process was not under effective human control."[52] The pediatricians continued to call attention to accidents in general and poisonings in particular because both were so terrible and so frequent and both appeared to be preventable. The doctors targeted their specialist colleagues and then the more general public, particularly those in charge of children, to make them aware of the dangers of poison and the importance of taking immediate action. By the mid-1950s, pediatricians were also simultaneously enlisting the concern of all physicians, most obviously through publications in general medical journals.[53]

One of the essential aspects of the poison control center movement was the publicity that it gave to the pediatricians' views of the toxic substances that their experience had shown to exist in the immediate environment of the home. The publicity was enormously successful. It preempted other safety efforts; as early as 1957, over half of the pediatricians' State Accident Prevention Committees were devoting 100 percent of their efforts to poison control. Officer Ugg, Mr Yuk, and Uncle Barf were but small tokens of the awareness that the centers engendered. National publications as well as the still more important local institutions gave enormous publicity to the dangers that chemicals in their environments posed for children.[54]

As Press observed in one of the major medical articles advocating the new centers, the statistical summaries of the work of the centers lent themselves "to excellent news releases and other types of educational information to the general public." Furthermore, as noted in 1958 by some New Jersey child specialists clearly impressed by the movement to found centers, when trying to prevent accidents, "poisoning lends itself best to an organized approach." By 1962, there was an annual National Poison Prevention Week, comparable to the earlier fire prevention week. Even before the environmental movement was fully launched in the 1960s, in American public discourse the concept of poison and even of toxicity had been appropriated by pediatricians and other medical sponsors of the centers. With roots that could have been environmental or pediatric, by 1969 it was possible to speak of "environmental control" when referring to guarding common poisons in the household.[55]

Toxins in the [Home] Environment

In 1954, in the major article announcing the poison control center movement, Edward Press and Robert B. Mellins spoke of a "toxin" in "almost every household in the United States," consisting of collections of

> ready-made and often highly virulent 'test-tube toxins' synthesized by modern industry and used in millions of households to clean clothes, kill flies or rats, provide heat, and accomplish many other everyday tasks. It is no longer necessary to go surreptitiously to the apothecary to buy some arsenic to have poison available .... The major threats to early death formerly made by epidemics of smallpox, cholera, and plague are now being replaced by accidental injury and poisoning....

They went on to speak of atomic radiation hazards as well as the toxic products "synthesized by modern industry" that were replacing "the toxic products generated by germs."[56]

When Rachel Carson wrote *Silent Spring* almost a decade later, she too spoke of the decline of the danger of infectious disease and the new threat of synthetic chemicals. A substantial element in the impact of her book derived from her suggestion that chemicals posed a direct threat to human health. In that section, Carson moved from occupational to accidental poisoning that threatened each of us. She concluded that "the average citizen is seldom aware of the deadly materials with which he is surrounding himself; indeed, he may not realize he is using them at all."[57]

In 1966, writing on "Poisoning Hazards in the Home Environment," Press noted how the shift to concern over the environment impinged on the poison control movement that he and other pediatricians had launched. Addressing an American Medical Association Congress on Environmental Health Problems, Press asserted that "our current environment abounds with chemicals capable of causing accidental ... poisoning. Literally hundreds of thousands of different kinds and combinations of liquids, solids, and gasses can pose potential threats to the unwary, and particularly to the immature and exploring infant and child." Chemical hazards, he continued, also "stem from the inhalation of potential carcinogens from air polluted by combustion products of tobacco (or gasoline or coal) ..." as well as other directly toxic substances. He concluded, "Where the family physician of the 'horse-and-buggy age' concentrated on the diagnosis, prognosis, and treatment of communicable diseases, the modern physician is much more concerned with the prevention and treatment of disorders related to chemical hazards in the environment."[58]

The idea of accidents, from which the poison control center movement had spread, did not undergo the same changes as did poisonings. Accidents continued to refer to specific parts of the body, such as an arm that was fractured in contrast to poisonings, which now involved substances. The accident itself was not of primary interest as much as the infection that might proceed from it. Midcentury M.D.s did begin to talk about "injuries," not accidents, but in so doing, they focused on the damage done, still without the implied object that did the damage.[59]

There was a shift in public as well as medical discourse from poisoning by means of an active human agent, even a responsible parent, to poisoning in which the victim was accidentally a victim—and who more typically a victim than a trusting toddler? What more

accidental than to be poisoned by impersonal toxins in the environment, whether in the home, in the area around the home, or in the general geographical surroundings?

Conclusion

There is some argument that there never was an environmental crisis, or that all such movements are on some level mere cultural inventions.[60] Of course cultural factors shaped some of the direction of the movement. But the initial events consisted of the immediate experiences of many Americans. Some historians have already made that point, citing urban pollution, and noting that concern grew out of other obvious, easily observable conditions such as smog in many people's surroundings.[61]

In the case of childhood accidental poisoning, new ways of thinking about poisoning and the environment grew out of hard facts observable in the practices of American pediatricians who saw and shared many families' tragedies. As the physicians responded to these tragedies with the Poison Control Center movement, they called attention to toxic substances that were delivered not by any personal agent, but simply existed in familiar surroundings. Increasingly in the mid-twentieth century, in public discourse that fed into the environmental movement, unobvious poisons were having disastrous effects in what otherwise appeared to be an innocuous environment.

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[2] See for example Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (Cambridge: Cambridge University Press, 1987), especially 527-531.

[3] Robert S. Broadhead, "Officer Ugg, Mr Yuk, Uncle Barf ... Ad Nausea: Controlling Poison Control, 1950-1985," *Social Problems*, 33 (1986), 424-437. Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin Company, 1962), 155, speaks specifically of the transformation of poisons once "kept in containers marked with skull and crossbones ..." but later spread indiscriminately. The Federal Hazardous Substances Labeling Act of 1960 defined "toxic" so broadly as to "apply to any substance ... which has the capacity to produce personal injury or illness to man through ingestion, inhalation, or absorption through any body surface;" quoted from Thomas W. Nale, "The Federal Hazardous Substances Labeling Act," *Archives of Environmental Health*, 4 (1962), 239-246, which provides some historical context.

[4] Carson, *Silent Spring*, 176-177; additional examples of language use are discussed below. Thomas R. Dunlap, "Review Essay: Before, During, and After Silent Spring," *Environmental Review*, 6 (1978), 34-40, puts *Silent Spring* in context. See in general Joseph M. Petulla, *American Environmental History: The Exploitation and Conservation of Natural Resources* (San Francisco: Boyd & Fraser Publishing Company, 1977), chap. 17, and Hays, *Beauty, Health, and Permanence*.

[5] Hays, *Beauty, Health, and Permanence*, 529.

[6] Lloyd G. Stevenson, *The Meaning of Poison* (Lawrence: University of Kansas Press, 1959).

[7] The process of popularizing to various population segments is described in John C. Burnham, *How Superstition Won and Science Lost: Popularizing Science and Health in the United States* (New Brunswick: Rutgers University Press, 1987).

[8] Those long concerned with water pollution also became aware of the new types of chemicals at about the same time. The subject of the synthetics is taken up below.

[9] A relevant account of the development of pediatrics as a specialty in a social and medical context is given in Charles R. King, *Children's Health in America: A History* (New York: Twayne Publishers, 1993). A more general account is Sydney A. Halpern, *American Pediatrics: The Social Dynamics of Professionalism, 1880-1980* (Berkeley: University of California Press, 1988).

[10] Katharine Bain, "Death Due to Accidental Poisoning in Young Children," *Journal of Pediatrics*, 44 (1954), 616; Douglas Swinscow, "Accidental Poisoning of Young Children," *Archives of Disease in Childhood*, 28 (1953), 26-29.

[11] Poisoning, for example, was not a heading in Charles E. de M. Sajous, ed., *Sajous's Analytic Cyclopedia of Practical Medicine* (9th ed., Philadelphia: F. A. Davis Company, 1925).

[12] See the publications of the National Safety Council, which were widely represented in the press. An early summary is Charles B. Scott, "Our National Accident Problem," *American Journal of Public Health*, 19 (1929), 141-144. A committee was appointed in 1929, and some publicity followed; see Sidney J. Williams, "Home Accidents and Home Economics," *Journal of Home Economics*, 22 (1930), 184-190; "Safety Begins at Home," *The Survey*, 63 (1929), 91. The launching of the housewives campaign was reported in the *Transactions of the National Safety Council*, 1937, 21. See also *Transactions of the National Safety Council*, 1939, v. 2, 133-136, to suggest how slowly the campaign got underway. Joel A. Tarr and Mark Tebeau, "Housewives as Home Safety Managers: The Changing Perception of the Home as a Place of Hazard and Risk, 1870-1940," paper presented at the American Public Health Association meetings, 1994. Thomas Fansler, "Child Safety—Public Health," *Home Safety Review*, August-September, 1948, 12-13, 15. The independent efforts of public health workers are briefly described in *Proceedings of the First Conference on Home Accident Prevention, January 20, 21, and 22, 1953* (Ann Arbor: School of Public Health, University of Michigan, 1953), 6-8, 20-21; they emphasized gathering information about the problem (a contemporary document is "Accident Prevention—An Essential Public Health Service," *American Journal of Public Health*, 35 [1945], 216-220). The whole of these Proceedings provides an excellent indication of the way in which the home accident problem contextualized poisonings. As C. J. Velz and F. M. Hemphill, *Investigation and Application of Home Injury Survey Data in Development of Prevention Procedures* (Ann Arbor: The University of Michigan School of Public Health, 1953), show, public health workers who were pioneering work with home injuries spoke already in terms of controlling hazards in the environment.

[13] "Child Accidents in the Home," *Accident Facts*, 1947, 84; Edward Press, "The Accident Problem," *Journal of the American Medical Association*, 135 (1947), 824-827; A standard account was George Wolff, *Childhood Mortality from Accidents, by Age, Race, and Sex and by Type of Accident* (U.S. Children's Bureau Publication 311, Washington: U.S. Government Printing Office, 1945), especially 12. See U. S. Children's Bureau, "Childhood Mortality," 1953 minutes (courtesy of Joel A. Tarr). Harold Jacobziner, "Accidents—A Major Child Health Problem," *Journal of Pediatrics*, 46 (1955), 419. The midcentury context is described succinctly and authoritatively in Edwin R. Schlesinger, *Health Services for the Child* (New York: McGraw-Hill Book Company, 1953), 209-217. Luther L. Terry, "The Magnitude of the Problem," in Maxwell N. Halsey, ed., *Accident Prevention: The Role of Physicians and Public Health Workers* (New York: McGraw-Hill Book Company, 1961), 2-3, provides summary charts of comparative death rates.

[14] George M. Wheatley, "Mobilization Against Rheumatic Fever," *Journal of Pediatrics*, 26 (1945), 237; such figures as this appeared routinely in the medical literature. While definitive statistics on the decline of infectious and metabolic diseases are not available, those sources that exist confirm the impressions of practitioners of that day.

[15] An eyewitness account of the work of the Committee is George W. Starbuck, "Recent Trends in Accident Prevention," *Pediatrics*, 22 (1958), 761-773. Any number of case reports had earlier attempted to alert practitioners to the problem; see, for example, Michael A. Brescia and James M. Dobbins, "Acute Phosphorus Poisoning; Report of a Case with Recovery," *Journal of Pediatrics*, 21 (1942), 378. Some observers noted that fatalities might not be the best basis on which to judge incidence of poisonings; see, e.g., Marta Fraenkel and Carl L. Erhardt, *Morbidity in the Municipal Hospitals of the City of New York; Report of an Exploratory Study in Hospital Morbidity Reporting* (New York: Russell Sage Foundation, 1955), 96. Other statistics showed a lower percentage of poisonings, but never one that was small; typically it was reported that one out of a hundred hospital pediatric admissions was a poisoning case. Another approach to estimating the problem was to note that for every poisoning

fatality, there were from 100 to 200 nonfatal cases (the multiplier depending on the author); see, for example, Irvin Kerlan, "Preventing Accidental Poisoning," *Journal of the American Medical Association*, 158 (1955), 1370; Howard M. Cann et al., "Survey of Poison Control Centers," *Pediatrics*, 23 (1959), 359. This could lead to an estimate of as many as 40,000 to 80,000 cases of poisoning in children under five each year at midcentury. This type of estimate contrasted with a survey of twenty years earlier that showed no poisonings at all in 143 Illinois homes—but plenty of other accidents, especially those involving small children; Gladys J. Ward, "Home Accidents and Home Management," *Journal of Home Economics*, 25 (1933), 770-772.

16 L. T. Chun, "Accidental Poisoning in Children, With Special Reference to Kerosene Poisoning," *Hawaii Medical Journal*, 11 (1951), 84-85.

17 G. W. Kernodle, reported in *American Journal of Diseases of Children*, 75 (1948), 141. See, for example, such statements as "nicotine poisoning appears to be increasing" in an article in which an actual case set off a search of the literature that revealed a number of recent reports among medical pbulications; Byron B. Oberst and Ross A. McIntyre, "Acute Nicotine Poisoning," *Pediatrics*, 11 (1953), 338. Numerous commentators noted geographical differences in the incidence and nature of reported accidental poisonings; Harry Gold et al., "Household Poisonings," *American Journal of Medicine*, 6 (1949), 237-246, elicited the experience of the staff at New York Hospital, for example, which showed that troubled inquiries far outnumbered the really serious cases. The acute concern expressed strongly in this clinical conference, however, was to get accurate information about precisely what substances were in the household so that safe action could be taken if a child got hold of some product. Information centers such as were subsequently established clearly answered a strongly felt need among physicians. It should be emphasized that the poisoning problem was relative, and the increases were not in absolute numbers (all accidental fatalities were declining), but in the position of poisoning in relation to other health incidents; see, for example, Schlesinger, *Health Services*, 213.

18 See, for example, Donald B. Armstrong and W. Graham Cole, "Home Accidents—Where, How and Why?" *National Safety Council Transactions*, 1940, 177-183, which set up a public health model for the problem of accident prevention; D. B. Armstrong and W. Graham Cole, "Can Child Accidents Be Prevented in Your Community?" *American Journal of Public Health*, 39 (1949), 585-592.

19 George M. Wheatley, personal interview, May 16, 1992. An account of home accident statistics is to be found in *Proceedings of the First Conference on Home Accident Prevention*, 6-60. In 1946, when the American Academy of Pediatrics set out an official statement of goals for postwar medicine, the Academy cited statistics compiled by the Metropolitan Life Insurance Company and added, "May we call to your attention the prominent position which accidents have in this tabulation [?];" *Journal of Pediatrics*, 29 (1946), 404. The extent to which the National Safety Council answered similar hard statistical concerns in helping to target childhood poisonings after World War II can be seen in A. L. Chapman, "An Analysis of the Home Accident Problem," *Transactions of the National Safety Council*, 1950, 28, where the major problems in home safety were listed in order: (1) falls among those over 65; (2) burns among children under 5; (3) burns among those over 65; (4) infant suffocation—the cause of which was already not clear; (5) poisoning in children under 5. The fire safety campaigns served as perhaps inappropriate models for safety campaigns against poisoning. The problem of poisoning, especially childhood poisoning, showed up as early as 1948-1949 in the *Home Safety Review*. Although, as noted above, the accidental death rates decreased throughout the first half of the twentieth century (see *Accident Facts*, 1940-1956), demographic changes caused increases in absolute numbers among the very young and the very old. In any event, life insurance and National Safety Council concerns were based directly on the growth of the relative importance of childhood poisonings.

20 George M. Wheatley, "Child Accident Reduction: A Challenge to the Pediatrician," *Pediatrics*, 2 (1948), 367-368.

21 A general account of the whole accident prevention effort is George M. Wheatley, "Prevention of Accidents in Childhood," *Advances in Pediatrics*, 8 (1956), 191-215. Wheatley interview, May 16, 1992. "Pediatricians' Session," *Home Safety Review*, December 1950, 2-3. An early account is Edward Press, "Chicago Poisoning Control Program," *Home Safety Review*, September 1954, 2-3.

22 John E. Gordon, "The Epidemiology of Accidents," *American Journal of Public Health*, 39 (1949), 504-515, quote on 508. See, for example, Schlesinger, *Health Services*, 214-217. The full history of the development and impact of epidemiology in the middle of the twentieth century has yet to be written. Christopher Sellers, "Environmental vs. Occupational Health: The United States Public Health Service's Pesticide Study of 1938," paper presented at the meetings of the Organization of American Historians, Anaheim, CA, April, 1993, shows that there was also tension between two other approaches to understanding poisoning: the laboratory and the clinical. Both affected the public health and medical approaches to poisons and helped move occupational medicine concerns into concerns about

the toxicity of consumer goods. Nevertheless, it was the pediatricians who spearheaded practical campaigns to educate the public about toxic substances.

23 See ibid.; Press, "The Accident Problem;" Edward Press, "Epidemiological Approach to Accident Prevention," *American Journal of Public Health*, 38 (1948), 1442-1445; Armstrong and Cole, "Can Child Accidents Be Prevented in Your Community?" The history of the concept of the "home" as a unit is explored in Clifford Edward Clark, Jr., *The American Family Home, 1800-1860* (Chapel Hill: University of North Carolina Press, 1986).

24 An unpublished paper explores some of the question of responsibility: John C. Burnham, "Why Did the Infants and Toddlers Die?" "Shifts in Americans' Ideas of Responsibility for Accidents: From Blaming Mom to Engineering," *Journal of Social History*, in press.

25 See Yandell Henderson, "Household Health Hazards," *Scientific Monthly*, 37 (1933), 61-64. This pattern of finding poisons in the home environment extended even to all poisonings, not just those of small children; see, for example, C. Anthony D'Alonzo and Allan J. Fleming, "Acute Poisoning in the Wilmington Area," *Delaware State Medical Journal*, 27 (1955), 100-103. Ultimately, of course, the idea grew that manufacturers and others bore some responsibility for the new consumer products; see below. The so-called economic poisons—insecticides, fungicides, herbicides, and the like—appeared at the time to have been controlled by legislation, at least to the point of being labeled. Some background is found in James Whorton, *Before* Silent Spring: *Pesticides and Public Health in Pre-DDT America* (Princeton: Princeton University Press, 1974), who shows a continuity from Paris green and arsenic to DDT. Lloyd J. Roth, "Poisonings," *Medical Clinics of North America*, 38 (1954), 199, claimed regarding a 1947 act on labeling economic poisons that "There are ... numerous violations of this Federal Act and the physician may be presented with an emergency without being able to identify the responsible agent in the poisoning."

26 Frank C. Neff, *Diseases of the Digestive System of Childhood* (New York: D. Appleton and Company, 1930), vol. VIII of Royal Storrs Haynes, ed., *Clinical Pediatrics*, 310.

27 Geoffrey Woodard and Herbert O. Calvery, "Acute and Chronic Toxicity—Public Health Aspects," *Industrial Medicine*, 12 (1943), 55, 58.

28 John Aikman, reported in *Pediatrics*, 2 (1948), 209.

29 Since many other groups in the environmental movement sooner or later came to blame industry for destroying and poisoning the environment, why did the pediatricians and public health workers not try to blame manufacturers for poisonings? The answer lies in the public health practice at that time, which depended upon education and, particularly after World War II, labeling to prevent accidents—keeping ultimate responsibility on the individual citizen who presumably would ignore labels at his/her own peril. See Burnham, "Why Did the Infants and Toddlers Die?" and *Read the Label on Foods, Drugs, Devices, Cosmetics, and Household Chemicals* (United States Food and Drug Administration Publication No. 3, Washington: Government Printing Office, 1951).

30 Edward Press, "Public Health Aspects of Poisoning," *Journal of the American Medical Association*, 163 (1957), 1330. The conclusion to this article, 1332, makes the point again: "Man's environment is becoming packed with poisons, so that they represent a substantial threat to public health. The American Academy of Pediatrics, because of the special problem of accidental poisoning occurring in children, spearheaded a movement to develop poison control centers ...."

31 See, for example, "Toxic Chemicals in the Home," *Home Safety Review*, December 1950, 5; *The 1948 Year Book of Pediatrics*, 513; Hugh C. Thompson, "Potassium Bromate Poisoning: Report of a Case Due to Ingestion of a 'Cold Wave' Neutralizer," *Journal of Pediatrics*, 34 (1949), 362-364; S. A. Warren, "Clinical Recovery Following Prolonged Anuria in an Infant Two Months of Age," *Pediatrics*, 5 (1950), 954-958; the infant was fed "Toni" neutralizer by accident.

32 James V. Mackell et al., "Acute Hemolytic Anemia Due to Ingestion of Naphthalene Moth Balls," *Pediatrics*, 7 (1951), 722-725. William B. Schafer, "Acute Hemolytic Anemia Related to Naphthalene," *Pediatrics*, 7 (1951), 172-174.

33 Herman Grossman, "Thallotoxicosis; Report of a Case and a Review," *Pediatrics*, 16 (1955), 868-872.

34 Morton J. Rodman, "A Survey of Potentially Harmful Household Products," *Journal of Pediatrics*, 46 (1955), 171-181. See, for example, Lewis Herber [pseud.], *Our Synthetic Environment* (New York: Alfred A. Knopf, 1962). There is no attempt here to explore the concept of synthetics that played a substantial role in the environmental movement. See, for example, Petulla, *American Environmental History*, 366-368.

35 By the late 1950s, the pediatric literature included repeated expressions of concern about iatrogenic afflictions of many kinds. Roy Hertz, "Accidental Ingestion of Estrogens by Children," *Pediatrics*, 21 (1958), 206. There was speculation that a dramatic increase in childhood accidental poisonings in Britain, which alarmed Americans for some time in the absence of good statistics for the United States,

was in part owing to the sudden increase of medication following the introduction of the British health care system; see Wheatley, "Prevention of Accidents in Childhood," 197.

36 See, for example, Katharine Dodd, G. John Buddingh, and Samuel Rapoport, "The Etiology of Ekiri, A Highly Fatal Disease of Japanese Children," *Pediatrics*, 3 (1949), 9-18; Niels L. Low, "Electroencephalographic Studies Following Pertussis Immunizations," *Journal of Pediatrics*, 47 (1955), 35. Allergists constituted another group of medical specialists who contributed to environmental awareness; they were emphasizing not only individual reactions but the new chemicals with which humans were surrounding themselves; see, for example, Theron G. Randolph, *Human Ecology and Susceptibility to the Chemical Environment* (Springfield, IL: Charles C. Thomas, 1962).

37 Henry G. Poncher, in *The 1949 Year Book of Pediatrics*, 489.

38 Willis F. Stanage and J. A. Henske, "Accidental Ingestion of Poisons," *Journal of Pediatrics*, 47 (1955), 470-474; Bernard L. Lipman, Sidney O. Krasnoff, and Robert A. Schless, "Acute Acetylsalicylic Acid Intoxication," *American Journal of Diseases of Children*, 78 (1949), 477; Jay M. Arena, "Safety Closure Caps," *Journal of the American Medical Association*, 169 (1959), 1187-1188; Jay M. Arena, "The Pediatrician's Role in the Poison Control Movement and Poison Prevention," *American Journal of Diseases of Children*, 137 (1983), 870-873; Charles D. May, "Iatrogenic Disease," *Pediatrics*, 22 (1958), 2.

39 Sydney S. Gellis, "Pediatric Emergencies," *Missouri Medicine*, 50 (1951), 838.

40 These terms had of course occurred commonly in the medical literature, but in the middle of the twentieth century they became more conspicuous and common in the context of childhood accidental poisonings. For example, Thomas K. Oliver, Jr., "Chronic Vitamin A Intoxication," *American Journal of Diseases of Children*, 95 (1958), 57-68; William G. Way, David L. Morgan, and Lee E. Sutton, Jr., "Hypertension and Hypercalcemic Nephropathy Due to Vitamin D Intoxication," *Pediatrics*, 21 (1958), 59-69; or compare Robert W. Winters, "Therapy of Salicylate Poisoning," *Pediatrics*, 23 (1959), 255-257, with Robert Schwartz et al., "The Renal Response to Administration of Acetazelomide (Diamox) During Salicylate Intoxication," *Pediatrics*, 23 (1959), 1103-1114. In so far as a similar shift appeared in the literature of toxicology, the causes were identical; W. F. von Oettingen, *Poisoning: A Guide to Clinical Diagnosis and Treatment* (Philadelphia: W. B. Saunders, 1952), ix, wrote: "While death is the most dramatic manifestation of poisoning, subacute and chronic poisonings are far more common and offer serious problems for diagnosis .... The incidence of poisoning, both acute and chronic, is constantly increasing as new chemicals for the most diversified purposes are placed on the market and are used in homes and industry .... There are literally hundreds of substances in use or to which one may be exposed today which may give rise to poisoning. Some of these toxic syndromes closely simulate infectious or functional diseases." Christopher Sellers has pointed out to me that a parallel change occurred somewhat earlier in occupational medicine, as, for example, Alice Hamilton changed the title of her book, *Industrial Poisonings in the United States* (1925) to *Industrial Toxicology* (1934); the extent to which such changes in one medical subfield affected thinking in another is not obvious in the sources. Likewise, it was not clear that increasing attention in occupational medicine to chronic disease and chronic poisoning had effects in pediatrics.

41 Ralph H. Lutts, "Chemical Fallout: Rachel Carson's *Silent Spring*, Radioactive Fallout, and the Environmental Movement," *Environmental Review*, 9 (1985), 210-225.

42 See Hays, *Beauty, Health, and Permanence*, especially 35, 55-56, 62.

43 J. Monte Johnston, "Parathion Poisoning in Children," *Journal of Pediatrics*, 42 (1953), 286-291. The symptoms suggested that the DDT was not a significant factor in the child's death. D'Alonzo and Fleming, "Acute Poisoning in the Wilmington Area," 100-103, quote from 102. The authors' implication that non-acute poisoning was still an occupational problem cannot be explored here.

44 See Joel A. Tarr, "Industrial Wastes and Public Health: Some Historical Notes, Part I, 1876-1932," *American Journal of Public Health*, 75 (1985), 1059-1067, and, for example, Donald J. Pisani, "Fish Culture and the Dawn of Concern Over Water Pollution in the United States," *Environmental Review*, 8 (1984), 117-127. Terence P. Kehoe, "Politics, Policy, and Water Pollution Control: Cleaning Up the Great Lakes, 1966-1978" (doctoral dissertation, Ohio State University, 1995), shows that workers in another stream contibuting to environmentalism commented on the appearance of new chemicals in this period. The other great medical paradigm then current was the deficiency disease—exactly the opposite of some substance added to a human's biology.

45 For example, Jay M. Arena, "Childhood Poisonings," *Home Safety Review*, November 1955, 4.

46 See, for example, Samuel E. Elmore, "Ingestion of Mercury as a Probable Cause of Acrodynia and Its Treatment with Dimercaprol (BAL): Report of Two Cases," *Pediatrics*, 1 (1948), 643-647; and especially Josef Warkany, "Acrodynia—Postmortem of a Disease," *American Journal of Diseases of Children*, 112 (1966), 147-156.

47 See, for example, Maurice Ferrant, "Methemoglobinemia, Two Cases in Newborn Infants Caused by Nitrates in Well Water," *Journal of Pediatrics*, 29 (1946), 585-592; Will E. Donahoe, "Cyanosis in

Infants with Nitrates in Drinking Water as a Cause," *Pediatrics*, 3 (1949), 308-311; American Academy of Pediatrics Committee on Nutrition, "Estrogenic and Androgenic Agents in Meats and Poultry," *Pediatrics*, 25 (1960), 896-899.

[48] See Thomas R. Dunlap, *DDT: Scientists, Citizens, and Public Policy* (Princeton: Princeton University Press, 1981), especially 78-79. And see, for example, Robert L. Rudd, *Environmental Toxicology; A Guide to Information Sources* (Detroit, MI: Gale Research Company, 1977), Section 3. For an example of awareness, see J. E. Brown and John Aikman, reported in *Pediatrics*, 2 (1948), 220. A parallel change in technical works on regular (i.e., adult) toxicology is striking; in older works, such as Thomas A. Gonzales et al., *Legal Medicine and Toxicology* (New York: D. Appleton-Century Company, 1940), 448, the fundamental definition emphasized that certain substances were poisonous to the human being; in later works, such as Sidney Kaye, *Handbook of Emergency Toxicology: A Guide for the Identification, Diagnosis, and Treatment of Poisoning* (Springfield, IL: Charles C. Thomas, 1980), 5, the quantitative factor appeared prominently in the fundamental definition: "*almost anything* is a potential poison when taken in 'sufficient quantity.'" Many of the earlier treatises simply classified poisons, as if the issue of what was poisonous was too obvious for discussion; for example, O. H. Costill, *A Practical Treatise on Poisons: Their Symptoms, Antidotes, and Mode of Treatment* (Philadelphia: J. B. Lippincott & Co., 1864), 13-15. The pediatricians of course drew upon standard medical works, and changes in the idea of poisoning had appeared here and there before the 1940s, but it was the child specialists, not toxicologists or pharmacologists, who were most generally influential in both raising the alarm and furnishing content as environmentalism was beginning to develop and to focus on toxicity in the environment. Some background on the latter point is furnished by James C. Whorton, "Insecticide Spray Residues and Public Health, 1865-1938," *Bulletin of the History of Medicine*, 45 (1971), 219-241.

[49] M. Kagan et al., "Cyanosis in Premature Infants Due to Aniline Dye Intoxication," *Journal of Pediatrics*, 34 (1949), 574- 578.

[50] See, for example, "Report of Subcommittee on Accidental Poisoning, Statement on Hazards of Boric Acid," *Pediatrics*, 26 (1960), 884, urging the removal of boric acid from sites where accidental poisoning was a possibility.

[51] Hays, *Beauty, Health, and Permanence*, especially 277; Arena, "The Pediatrician's Role in the Poison Control Movement." See, for example, "Accidents," *Journal of Pediatrics*, 34 (1949), 799; Walter Modell, quoted in "Household Poisonings II," *American Journal of Medicine*, 8 (1950), 375. In the report of the Home Safety Congress, 1954, insecticide hazards and the poison control center movement were juxtaposed.

[52] Hays, *Beauty, Health, and Permanence*, 8-9.

[53] Broadhead, "Officer Ugg, Mr Yuk, Uncle Barf." See, for example, Jay M. Arena, "The Problem of Accidental Poisoning in Children as It Exists Today," *Journal of the American Medical Association*, 159 (1955), 1537-1539. There was by that time great interest in the subject by the new AMA Committee on Toxicology, which was working closely with the American Academy of Pediatrics; see, for example, *Journal of the American Medical Association*, 158 (1955), 831; "A.M.A. Committees Study Poisons," *Home Safety Review*, 13 (1956), 24. The National Safety Council Home Safety Conference minutes, 1951-1954 (Library, National Safety Council, Itasca, IL), contain some details of the campaign to reach both the general practitioner and the public.

[54] Starbuck, "Recent Trends in Accident Prevention," 768. Marion Gleason, "Poison Proof Your Home," *Parents' Magazine*, March 1965, 34, 130, directly ties awareness of poisons in the home to the poison control center movement. No historian has yet traced the amazing way in which the poison control centers affected both organizations and the media; some hints are to be found in contemporary issues of the *Home Safety Review*. Broadhead, "Officer Ugg, Mr Yuk, Uncle Barf," 427-428, describes the rise of the poisoning scare in the media after the founding of the poison control movement and the way in which the movement fostered the publicity, beginning especially with an article in *Reader's Digest* in 1956; I do not attempt to repeat all of his evidence here. See, for example, Selwyn James, "Poison Control Centers," *Parents Magazine*, September 1956, 38-39, 128-129; Wayne G. Branstadt, "Poisoning in Children," *Today's Health*, October 1956, 13. In general, most publicity followed press releases by the National Saftey Council until the poison control center movement developed its own momentum. An earlier article on childhood accidents, Daisy Jenney Clay, "20,000 Children Die Needlessly," *Better Homes and Gardens*, May 1946, 113, for example, does not even mention poisoning among the hazards. By contrast, later popular literature was clearly affected by the poison/safety campaigns, including, for example, even one specialized mid-1950s book, Ibert Mellan and Eleanor Mellan, *Dictionary of Poisons* (New York: Philosophical Library, 1956), 3. One important document—and a typical statement from the poison control center movement—was the official pronouncement by the Secretary of Health, Education, and Welfare, Arthur S. Fleming, "Accidental Poisoning," *Public Health Reports*, 75 (1960), 91-92.

55 Edward Press, "A Poisoning Control Program," *American Journal of Public Health*, 44 (1954), 1523. Samuel C. Southard et al., "The Mechanics of Establishing a Poison Control Center in a Community Hospital," *Journal of Pediatrics*, 52 (1958), 718. The formal movement to organize the centers nationally was already well under way by 1956; Katherine Bain to Dr. Eliot, December 5, 1956, Children's Bureau Files, National Archives, courtesy of Joel A. Tarr. "Control Program Recommended to Reduce Accidental Poisoning of Children," *Aerosol Age*, November 1969, 79, 71. It is remarkable that in the minutes of the Annual Meeting of Home Safety Conference, National Safety Council, October 19, 1954, poison control centers and the question of safety standards for pesticides appear in juxtaposition (Library, National Saftey Council). Joseph Street, *U.S.U. and the New Toxicology: 49th Honor Lecture* (Logan: Utah State University, 1974), 2-4, identified "the new toxicology" as environmental toxicology. While I have not attempted to repeat the work of Broadhead, "Officer Ugg, Mr Yuk, Uncle Barf," in documenting the publicity and impact of the poison control movement, he does not indicate strongly the change from local campaigns among various established institutions (safety committees, businesses, charitable groups, and schools, for example) as intermediaries to "the public" and the later direct confrontation of the mass media that were advertising many of the dangerous products; see, for example, Press, "Chicago Poisoning Control Program," 2; Kerlan, "Preventing Accidental Poisoning;" and especially Harry F. Dietrich et al., "Childhood Accidents and Their Prevention," *Pediatrics*, 8 (1951), 426-430.

56 Edward Press and Robert B. Mellins, "A Poisoning Control Program," *American Journal of Public Health*, 44 (1954), 1515.

57 Carson, *Silent Spring*, 174, and see especially 7, 15, 187, 188, and in general chaps. 10-14. Dunlap, "Before, During, and After Silent Spring," 36, comments that one of Carson's errors was to believe that "the greatest hazard from pesticides was to human health." N. Irving Sax, *Handbook of Dangerous Materials* (New York: Reinhold Publishing Corporation, 1951), for example, made a most interesting transformation during the 1950s into N. Irving Sax, *Dangerous Properties of Industrial Materials* (New York: Reinhold Publishing Corporation, 1957), suggesting that occupational hazards, too, were still being reconceptualized (and see p. 3).

58 Edward Press, "Poisoning Hazards in the Home Environment," *Archives of Environmental Health*, 13 (1966), 525.

59 For example, Robert B. Olstad and Robert M. Lord, Jr., "Kerosene Intoxication," *American Journal of Diseases of Children*, 83 (1952), 446-453, tried to talk of "accidental ingestions." The entire movement to shift to "injuries" was based in part on the discovery of accident proneness and was an attempt to avoid implying cause in this context. That subject is not relevant to this discussion.

60 One discussion of the literature is Miriam Lee Kaprow, "Manufacturing Danger: Fear and Pollution in Industrial Society," *American Anthropologist*, 87 (1988), 342-356. In addition to those who hold such views for purely theoretical or ideological reasons, another kind of argument is made by Edith Efron, *The Apocalyptics: Cancer and the Big Lie, How Environmental Politics Controls What We Know About Cancer* (New York: Simon & Schuster, 1984).

61 See, for example, Martin V. Melosi, "Urban Pollution: Historical Perspective Needed," *Environmental Review*, 3 (1979), 37-45.